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# Children's self-regulation skills in the Finnish day care environment

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***ABSTRACT:*** The topic of how children's self-regulation (SR) skills occur and develop has attracted researchers for decades. In this article, we focus on the content of children's SR skills and their relation to children's learning, social skills and special needs in the context of Finnish early childhood education (ECE). The SR skills of 2476 children, aged 13–89 months, were evaluated in day care centres between January and May 2015. Teachers completed questionnaires assessing children's SR, social, motor, language and metacognitive skills, as well as the children's adaptivity in peer relations and their attachment to ECE personnel. The results relate to previous studies showing how SR skills are highly related to children's ability to cope in social interaction and in terms of gender. The boys' SR skills were statistically significantly much weaker than girls'. Good SR skills also correlated positively with children's performance in metacognitive and motor skills. Weak SR skills had a strong connection to the child's qualification as having special needs. Children's SR skills may have an important role in helping children to regulate their development appropriately and to participate in creating a socially shared learning environment.

***Keywords*:** *self-regulation, early childhood education, child, skills, emotions*

## Introduction

The purpose of this article is to describe the relations between children's self-regulation (SR) skills and their social, motor, learning and language skills, executive functions and everyday life in the Finnish day care environment. In the field of early childhood education (ECE), developmental psychology and sociology, research has revealed the importance of SR skills, and this is a widely growing area of research (Dinsmore, Alexander & Loughlin,

2008; Eisenberg, Spinrad & Eggum, 2010). The results emphasize how a child's failure to acquire adaptive SR skills can lead to numerous difficulties in social competence and school adjustment (Eisenberg & Fabes, 2006; Graziano, Reavis, Keane & Calkins, 2007). Less is known about how SR skills interact with various other important skills in the Finnish ECE setting.

## The definition of SR

"SR skills" is a widely used concept to describe an individual's behaviour, intentions and cognitive adjustments. Baumeister and Vohs (2007) define SR as an individual's capacity to alter his/her behaviours. Shah and Kruglanski (2000) suggest that SR involves the pursuit of many different standards, ideals and goals in a person's everyday actions.

We define the concept of SR as a child's ability to adjust his/her own emotions, behaviour and cognitive functions, as well as the strength of a child to regulate frustrating situations and his/her attention properly (Ayduk et al., 2000; Aro, 2011, p. 10). As a part of SR skills, executive functions can be defined as processes which are involved in the conscious control of thought, emotion or action (Baddeley, 1996; Perner & Lang, 1999).

In self-determination theory (Moller, Deci & Ryan, 2006), the concept of SR is divided into autonomous SR and controlled SR. Autonomous SR emphasizes the individual's feelings in relation to emotions, behaviour and cognition. Self-determination theory presents the idea of how SR is determined for reasons that a person finds meaningful, values and wholly endorses. Controlled SR is characterized by an individual's feelings of external or internal pressure that conflict with what one would otherwise choose to do, for example, interpersonal rejection, avoiding shame, or physical punishment. This research focuses more on the autonomous SR point of view because it incorporates more specifically the child's inner emotional perspective, and the study's research instrument (Table 1) emphasizes an emotional point of view.

The study of SR skills has a long tradition and can be traced to Vygotsky (Bodrova & Leong, 2007). Vygotsky's sociocultural theory (1978) underlines the higher psychological functions as products of social interaction. These higher psychological functions always appear twice, first on the intermental level, where interactions with other person are mediated by communicative and semiotic means. Afterwards, when the child reaches the intramental level as a product of internalization, he/she can regulate his/her own thoughts and actions with the use of semiotic tools. Vygotsky (1978) highlights how the development of SR is highly dependent on the social interactions between adults and peer group. Play also provides an important and positively affective element to the experience of controlling one's own responses and behaviours (Dinsmore et al., 2008). According to Vygotsky (1978), children regulate and guide their own cognitive processes and actions

with the help of inner speech when they are facing a challenging situation. Piaget (1959) had previously referred to this phenomenon as egocentric speech.

## How do the SR skills develop?

SR skills do not develop in isolation. The first behaviours that a child can regulate are physical ones, such as thumb sucking during infancy. A toddler can regulate his or her coordination behaviour more intentionally by walking and reaching to obtain a wanted toy. At that age, a child's regulatory system is not ready enough to regulate emotional behaviours, such as the spontaneous sharing of a toy with a peer. Later, emotional SR skills help the child to cope with peer groups and adults more adequately when he/she is frustrated, upset or embarrassed (Kolestelnik, Whirren, Soderman & Gregory, 2009, pp. 45-47). Also, the quality of parenting has a strong impact on the development of SR in childhood. Parental sensitivity, warmth and responsiveness predict a child's good SR development (Murray, Rosanbalm, Christopoulos & Hamoudi, 2015). According to Montroy, Bowles, Skibbe, McClelland and Morrison (2016), the majority of children demonstrate rapid gains in SR across the preschool time period and this time period is a critical period in the development of SR. The transition to school is difficult for children with behavioural and developmental disabilities. SR skills are critical to school adjustment (Pears, Kim, Healey, Yoerger & Fisher, 2015).

Accordingly, one of the most important tasks in ECE is to improve and support children's SR skills. It has also been found that lack of SR may be related to bullying in ECE (Repo, 2013, pp. 19-20). It is important that educators and parents understand that children's SR skills are malleable; this could be a prevention target that could mean an optimal cost-benefit ratio in childhood (Moffitt et al., 2011). Immature SR skills may also stimulate elevations in cortisol stress-levels among children in group-care (Tout, de Haan, Campbell & Gunnar, 1998; Gunnar, Tout, de Haan, Pierce & Stansbury, 1997).

## The importance of SR and its relation to other skills

Several studies have found SR skills to be very significant in people's everyday social relations, studying, health and success in work (Moffitt et al., 2011; Lengua, Honorado & Bush, 2007; Eisenberg, Zhou, Losoya, Fabes, Shepard & Murphy, 2003; NICHD Early Child Care Research Network, 2003). SR skills could also be a preventive resource, for example, in reducing crime and health problems. In Moffitt's et al. (2011) longitudinal study from 1973 to this day on, the relations of SR have been studied with multidisciplinary methods. SR was assessed by researcher-observers, teachers, parents, and the children themselves across the ages of 3, 5, 7, 9, and 11 year. The sample included siblings, which revealed how lower SR skills related to worse outcomes, despite both siblings were from the same household and environment. The children with better SR skills were more likely to have

been brought up in socioeconomically advantaged families and had higher IQ's than others. Childhood weak SR skills predicted adult health problems and were more likely to be convicted of a criminal offense by the age of 32, even after accounting for social class origins and IQ.

The ECE environment plays an important role in reinforcing children's early emotional and social skills because it offers the opportunity to engage in social interactions with both unfamiliar peers and adults. Children can cooperate in peer interactions, which promote more prosocial behaviour, such as helping and sharing. It also acts as a restraint on aggressive and negative behaviour (Ladd, 2005). The growths of control over emotional, cognitive and social activities are linked to the sensory-motor development and physical maturation. The motivation influences the direction of development in these areas (Bronson 2000, pp. 4–5). Earlier studies (Cole, Zahn-Waxler & Smith, 1994; Eisenberg et al., 2001; Gilliom, Shaw, Beck, Schonberg & Lukon, 2002; Hill, Degnan, Calkins & Keane, 2006) suggest that SR skills are linked to expressive language and language delays (Cantwell & Baker, 1992). The studies highlight how child's difficulties in producing and understanding verbal information may influence to his/her control particularly emotion regulation. According to Aro (2003, pp. 244–245), language can support child's SR skills especially in social situations. Language controls child's perception and it helps him/her to interpret and name them. Language also contributes the child's ability to satisfy him/herself, consider and inhibit negative behaviour in social situations.

The emotional aspect of SR emphasizes the child's ability to recognize and handle emotional feelings, and therefore SR builds a strong foundation for empathy skills. Emotional SR skills help children to also understand the feelings and intentions of others. The earlier a child has support and possibilities to improve his/her emotional SR, the better capacity the child has to face and tolerate later experiences of stress and frustration (Eisenberg, Smith & Spinrad, 2011). Emotional SR skills and strategies are critical achievements during early childhood (Bronson, 2000, p.161; Sroufe, 1996). In McClelland et al., (2007) study, behavioural regulation was assessed using a direct measure called the Head-to-Toes Task, which taps attention, working memory and inhibitory control. It also requires children to perform the opposite of what is instructed verbally. Vocabulary skills were assessed with the picture vocabulary subtest, early mathematical skills were assessed with the applied problems subtest, and emergent literacy skills were assessed with the letter–word Identification subtest. The study revealed how growth in behavioural regulation predicted growth in emergent literacy, vocabulary, and math skills over the prekindergarten year after controlling for site, child gender, and other background variables.

Small differences in a young child's self-regulatory system can be magnified into larger differences in later life (Alexander, Entwisle & Kabbani, 2001; O'Shaughnessy, Lane, Gresham & Beebe-Frankenberger, 2003). Consequently, SR skills can be seen as a cumulative system, as Heckman notes: "skill begets skill; learning begets learning" (Heckman & Masterov, 2007, p. 3). Children's behavioural regulation is uniquely associated with their success in academic domains and competence in social interactions (Ponitz, Clelland, Matthews & Morrison, 2009; McKown, Gumbiner, Russo & Lipton, 2009).

The research questions of this study are:
1. *What skills are included in self-regulation skills and how are they related to each other?* and
2. *How self-regulation skills are related to children's social, motor, learning and language skills?*

## Method

This quantitative study is part of a larger research project (Orientation project), developed and conducted in Finland, Hong Kong and Taiwan since 2008. The Orientation project includes comparative research and learning-environment development based on the research results of ECE. This research uses the Finnish data collected by the project in 2015. The research has received a 24 000 euro funding grant from the Jenny and Antti Wihuri Foundation. The data are based on evaluations of children's skills conducted by the children's own teachers. The evaluation form includes Likert scale statements, which are related to children's motor development, language skills, play, peer-relations, attachment and emotions. The child evaluation instrument can be retrieved at http://www.helsinki.fi/~reunamo/apu/ch_eval15.pdf.

## Participants

The age range of the children ($N$ = 2476) in the groups was 13–89 months ($M$ = 63 months, $SD$ = 18.6 months). The participants included 1213 (42%) boys and 1075 (37.2%) girls. No gender data were reported for 601 (20.8%) children. The number of children in the groups varied from 11 to 29 ($M$ = 21 children, $SD$ = 4.3 children). All participating kindergartens ($N$ = 36) were municipal day care centres. Participation in the research varied in different municipalities ($N$ = 13). In some municipalities, all of the kindergartens participated; in others, the administration took a random sample of the kindergartens. In one municipality, all kindergartens from a certain area participated in the research. A few kindergartens declined to participate because they were moving to another location, for example, or renovations were in progress.

## The data collection and assessment of SR

The assessment of SR skills and other skills was based on the same evaluation form. The children's SR skills data were collected by asking the teachers to evaluate the skills of the children in their own groups. This approach was taken because the teachers were considered having the best pedagogical education, the most comprehensive experience, and the fullest knowledge of the children in their own groups. The teachers were asked to use an evaluation form based on a Likert scale (1-5). The form included different categories: age, gender, special needs, social skills, motor skills, adaptivity, attachment to ECE personnel, peer relations, and language and metacognitive skills. In total, there were 20 items in the evaluation form, of which six statements aimed to measure the children's SR skills. The statements were as follows:

1. *The child has no difficulty in challenging and dealing with frustrating situations interactively*,
2. *The child copes sensitively with his/her own feelings*,
3. *The child regulates his/her attention appropriately*,
4. *The child easily becomes emotionally upset in frustrating situations*,
5. *The child can inhibit his/her responses appropriately,*
6. *The child can maintain a level of arousal that is necessary for the activity.*

There were six statements, which measured the children's social skills. The internal consistency of the social skills was tested with Cronbach's alfa ($\alpha$=.869) which found to be high. The statements for social skills were:

1. *The child is flexible and adaptive in new situations,*
2. *The child is adaptive, open and considerate in peer relations,*
3. *The child is insistent, pushy (and perhaps self-centred) in peer relations,*
4. *The child has good social skills in a group of children,*

5. *The child is participative, open and shows initiative in peer relations*
6. *The child is withdrawn or non-social in peer relations*

There were four statements which measured the children's need of help in the motor, learning and language skills. The internal consistencies of the statements were sufficient enough with Cronbach's alfa (α=.838). The statements to the children's need of help were:

1. *The child needs much help in gross motor development*
2. *The child needs much help in fine motor development*
3. *The child needs much support in learning and metacognitive skills*
4. *The child needs support in language communication skills*

Children's attachment to ECE personnel, the avoidance of difficult and challenging situations and coping the feelings of others were tested with the following statements:

1. *Is securely attached to ECE personnel*
2. *Avoids difficult or challenging situations*
3. *Copes sensitively with the feelings of others*

The instrument was originally developed by Reunamo in 1997 (cf. Reunamo, 2007) and further enhanced in 2009 and 2014. The teachers were trained to use the instrument in February 2015. The reliability of the instrument is discussed in the results section here. There are other instruments for SR evaluation (see, for example, *Children's Behavior Questionnaire [CBQ],* Putnam & Rothbart, 2006). However, our evaluation has proved to work well with other independent research measures (cf. Rintakorpi & Reunamo 2016; Reunamo et al., 2013), and these add to the reliability of the evaluation instrument. The instruments can be retrieved at http://blogs.helsinki.fi/orientate/data-collection/.

## Analysis

A quantitative analysis of SR and other skills was conducted using IBM SPSS Statistics, and the internal consistency of SR skills was tested with Cronbach's alpha. The reliability test was suitable because the evaluated variables were based on a Likert scale. The measurement of SR skills consisted of 6 different items (Table 1). A summary variable of the six items was created. To increase clarity, the summary variable was transformed into three categories: weak, moderate and good. First, it is visually easier to survey the phenomenon, and second, several earlier studies on self-regulation skills have been based on three-tier categories (cf. Fabes et al., 1999). The categories were equal percentiles of the sample, each representing a third of the summary variable's distribution. We used a t-test to evaluate the statistical significances considering gender. In evaluating the differences in children's special needs we used chi-square tests. For the correlations

between SR and other skills we used partial correlations controlling for age and gender. In the correlations, we used the values of the summary variable (not the three categories).

## Ethics

The ethics forms for the children were collected from the parents and guardians. The research permission form can be retrieved at http://blogs.helsinki.fi/orientate/research-permits/. The children's names, birthdays, social security numbers, or other data making identification of a child possible were not collected; neither was the personal information of the parents nor that of the teachers. Instead, each child and child group received a number that was used in the analyses. The data collection was conducted as part of the everyday activities. The children's physical integrity was not violated in any way. The children were not exposed to strong stimuli, there was no register collect and the research procedures were harmless. The teachers, directors and municipalities received extensive feedback on the results. A better knowledge of regulatory processes and their relations can help teachers build better pedagogical interventions and environments for children.

# Results

## What skills are included in SR?

In this paragraph, we disclose what skills are included in children's SR skills and how they are related to each other. We begin by analysing the reliability of the SR instrument. First we present what items are included in our SR evaluation and the internal consistency of the instrument.

The means, standard deviations, sample sizes and reliability analyses' results are presented in Table 1 and Table 2. The sample sizes varied between 2294 and 2311 children. The means ranged from 2.59 to 3.68 and the standard deviations varied between 1.078 and 1.354. The item *Easily becomes emotionally upset in frustrating situations* had the lowest mean, but the standard deviation for this item was the largest, indicating that the variable may have slightly more impact in the summary variable of SR.

TABLE 1    Distributions of the SR instrument

| Self-regulation | N | Mean | SD |
|---|---|---|---|
| Can maintain a level of arousal that is necessary for the activity | 2294 | 3.68 | 1.088 |
| Regulates his/her attention appropriately | 2311 | 3.52 | 1.158 |
| Can inhibit his/her responses appropriately | 2294 | 3.51 | 1.150 |
| Copes sensitively with his/her own feelings | 2306 | 3.37 | 1.078 |
| Has no difficulty challenging and dealing with frustrating situations interactively | 2309 | 3.16 | 1.161 |
| Easily becomes emotionally upset in frustrating situations | 2304 | 2.59 | 1.354 |

TABLE 2    Reliability of the SR instrument

| Self-regulation | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|
| Has no difficulty in challenging and dealing with frustrating situations interactively | 17.51 | 21.214 | .594 | .847 |
| Copes sensitively with his/her own feelings | 17.29 | 22.566 | .508 | .861 |
| Regulates his/her attention appropriately | 17.14 | 20.541 | .673 | .833 |
| Easily becomes emotionally upset in frustrating situations | 17.26 | 19.057 | .682 | .833 |
| Can inhibit his/her responses appropriately | 17.16 | 19.667 | .777 | .814 |
| Can maintain a level of arousal that is necessary for the activity | 16.98 | 20.850 | .693 | .830 |

The internal consistency of SR skills was found to be high ($\alpha$ = .860). Thus, the items seem to measure the same phenomenon well. It was possible to make a summary variable of the six items. All six appeared to be worthy of retention, even though the item *Copes sensitively with his/her own feelings* did not add reliability to the summary variable ($r$ = .508, $N$ = 2306, Cronbach's alpha if item deleted = .861). Despite this, we decided to keep the item in the summary variable, because coping with feelings is an important aspect of the self-regulatory system. The correlation between children's age and the summary

variable was positive ($r = .243$, $p < .0005$, $N = 2279$). An analysis later in this paper, children's age is used as a control variable in partial correlations to prevent age being an intermediate variable. The evaluations of the skills in different SR items are presented in Table 2.

Girls' SR skills were considerably better than boys' (Figure 1). Altogether 41.2% of all girls' SR skills were evaluated as good but only 24.07% of boys. The difference between moderate SR skills between boys (31.3%) and girls (34.5%) was not great. However, within the lowest SR skills category only 24.3% of girls' SR skills were in the lowest category, whereas the boys' percentage was 44.6%. The statistical difference between boys and girls was tested with an independent t-test. The girls' SR skills ($M = 2.17$, $SD = .792$) were better than the boys' ($M = 1.79$, $SD = .803$) and the difference was statistically significant ($t = -11.208$, $df = 2286$, $p < .0005$, 95% CI [-.440, - -.309]. To prevent gender from being an intermediated variable we also use gender as a control variable in the partial correlations.
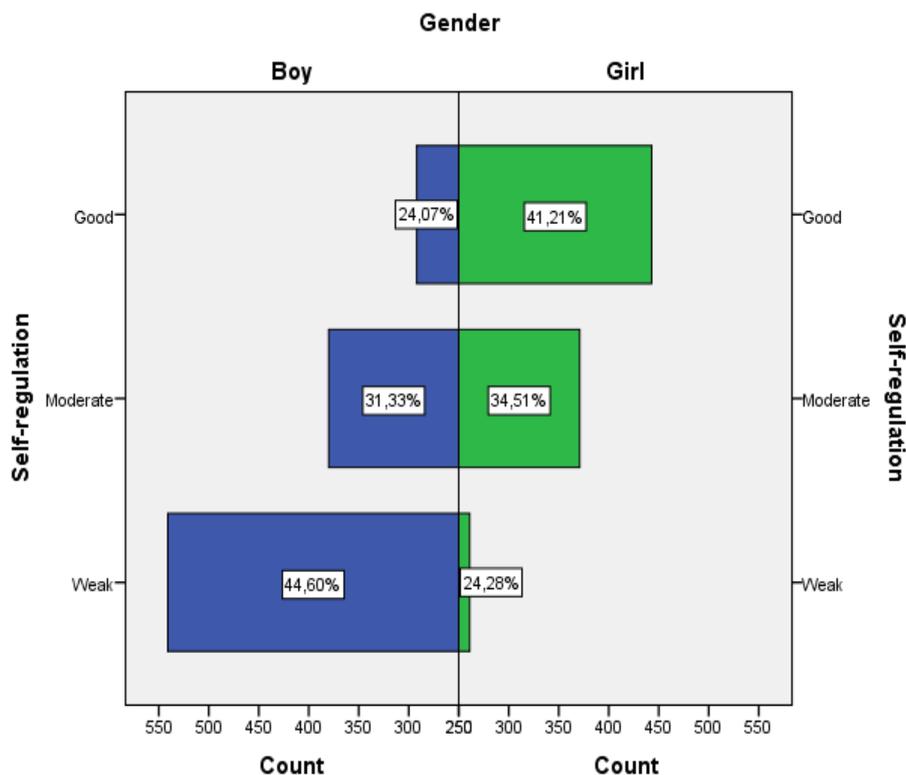


FIGURE 1    SR skills by gender

## Connections between SR and children's skills

Next, we present the connections found between SR and children's evaluated skills. The SR skills are based on the same evaluation instrument as children's skills. As previously mentioned, a child's age and gender (Figure 1) substantially affects SR skills. Therefore, all correlations are partial correlations controlling for the age and gender of the children.

TABLE 3    The partial correlations between SR and the need for support

| Self-regulation | Correlation | p | N |
|---|---|---|---|
| Copes sensitively with the feelings of others | .640 | .000 | 2306 |
| Needs much support in learning and metacognitive skills | -.460 | .000 | 2306 |
| Needs much help in fine motor development | -.325 | .000 | 2310 |
| Avoids difficult or challenging situations | -.310 | .000 | 2308 |
| Needs support in language communication skills | -.303 | .000 | 2309 |
| Needs much help in gross motor development | -.285 | .000 | 2308 |
| Is securely attached to ECE personnel | .208 | .000 | 2310 |

Note: These are partial correlations controlling for the age and gender of the child.

The results in Table 3 show SR skills in the day care environments to be highly related to children's social, communication, learning and motor skills. Children with lesser SR skills had difficulties coping with the feelings of others. Their attachment to and relations with the ECE personnel tended to be less secure. Furthermore, children with weak SR skills tended to have trouble confronting difficult and challenging situations. On the other hand, weak SR skills were found to be related to the children's need for help and support. Weak SR skills correlated with children's poor skills in fine and gross motor development. Children with weaker SR skills also more often needed help in language communication skills, and their need for support in learning and metacognitive skills was higher than other children's.

We also analysed the relationship between children's SR skills and children with special needs. Altogether 8.8% of the children had special needs, and, for some reason, in 26.2% the data on special needs were missing. The variety of special needs was wide, because special needs can relate to children's inability in, for example, social, motor, linguistic, and emotional development or physical disability. The relationship between SR skills and special needs was consistent with the results described in Table 3: only 2.6% of the children with special needs were evaluated to be in the highest category of SR skills, while the moderate SR skills category contained 7.9% of the children with special needs. Over a quarter (25.3%) of the children having special needs were in the category of least SR

skills. The differences in the categories were statistically significant, $X^2$ (2, $N$ = 2116) = 190.395, $p < .0005$, Cramer's V = .300).

TABLE 4    SR skills and qualifying as having a special need

|  |  | Self-regulation | | | |
| --- | --- | --- | --- | --- | --- |
|  |  | Weak | Moderate | Good | Total |
| Diagnosis | Problems in executive functions and regulation | 89.8%a | 10.2%b | b | 100.0% |
|  | Other | 85.7%a | 14.3%a | a | 100.0% |
|  | Socio-emotional problems | 84.6%a | 15.4%a | a | 100.0% |
|  | Developmental disability | 81.8%a | 13.6%a | 4.5%a | 100.0% |
|  | Development delay | 61.5%a | 23.1%a | 15.4%a | 100.0% |
|  | Physical or mental illness | 61.1%a | 27.8%a | 11.1%a | 100.0% |
|  | Linguistic difficulty | 59.7%a | 32.3%a | 8.1%a | 100.0% |
|  | Bilingual | 53.1%a | 37.5%a | 9.4%a | 100.0% |
|  | Delay in language development | 50.0%a | 42.9%a | 7.1%a,b | 100.0% |
| Total |  | 69.7% | 24.7% | 5.6% | 100.0% |

Each subscript letter denotes a subset of Self-regulation categories whose column proportions do not differ significantly from each other at the ,05 level.

The results in Table 4 indicate that children's weak SR skills related to the qualification for a special need. The relation between children's SR skills and having diagnosis for a special need was tested with cross tabulation, which certified the statistical significance, $X^2$(16, 267) = 33.702 p = .006. As can be assumed, lack of SR skills related to children's qualifying as having special needs in terms of executive functions and regulation. The differences between groups were statistically significant between children with weak SR skills and both moderate and good SR skills. This is the most common diagnostic classification for children with weak SR skills, and consequently certifies the reliability and stability of the SR instrument. None of the children with good SR skills were qualifying as having special needs for executive functions and regulation. Children with socio-emotional special needs were also found to be prevalent in children with weak SR skills

but the differences were not statistically significant. The category other contains all diagnostic classifications that were difficult to categorize, for example, the child needed an assistant or the diagnosis was not ready. The differences between these groups were not statistically significant.

By developmental disabilities, we mean mental or physical impairment, or a combination of these. These children were mostly in the weak SR category (81.8%), but the differences were not statistically significant. Furthermore, linguistic difficulty, bilingual and illness (physical or mental) were more common with children with weaker SR skills, but the differences were not statistically significant. However, the differences in the proportions of SR skills in the groups of delay in language development were found to be statistically significant between the groups of weak and moderate SR skills in comparison with good SR skills.

When we analysed the partial correlations between SR skills and children´s social skills (Table 5), we found that children's adaptive, open and considerate peer relations had a strong positive correlation with SR skills. Being flexible and adaptive in new situations was also highly related to good SR skills. Reacting insistently, as well as being pushy and self-centered in peer relations had a strong negative correlation with SR skills. It was also revealing that good SR skills were strongly linked to children having good social skills and being participative, open and showing initiative in peer relations in a group.

TABLE 5   Partial correlations between SR skills and social skills

| Self-regulation | Correlation | P | N |
| --- | --- | --- | --- |
| Is flexible and adaptive in new situations | .657 | .000 | 2311 |
| Is adaptive, open and considerate in peer relations | .644 | .000 | 2311 |
| Is insistent, pushy (and perhaps self-centred) in peer relations | -.616 | .000 | 2305 |
| Has good social skills in a group of children | .606 | .000 | 2308 |
| Is participative, open and shows initiative in peer relations | .440 | .000 | 2308 |
| Is withdrawn or non-social in peer relations | -.285 | .000 | 2310 |

Note: These are partial correlations controlling for the age and gender of the child.

# Discussion

The results described above indicate that children's teacher-rated SR skills are connected to many different aspects of development. Firstly, children with better teacher-rated SR skills were also reported as needing support or help less often than other children. Needing support occurs in situations where the ECE environment requires learning, metacognitive or language skills. Thus, these children had a greater need for support in learning while at the same time their skills in obtaining help were found to be weaker. This may have led to these children not having as many opportunities to practice their skills. It could also have led to a vicious circle. Children with weaker SR skills may have been excluded from contexts where they could practice their sensitiveness in the steering of their SR skills, while at the same time they may have been afraid to practice their skills in difficult situations (cf. Montroy et al., 2016). Secondly, children with better teacher-rated SR skills are strongly connected with children's ability to behave adaptively and flexibly in the social environment. Several studies have also pointed out how SR skills help the child to cope with peer groups and how child's failure to acquire adaptive SR skills can lead to numerous difficulties in social competence (Eisenberg et al., 2006; Graziano et al., 2007; Kolestelnik et al., 2009, pp. 45–47). It implies that children with good teacher-rated SR skills can form friendships more easily in the ECE environment. Teacher-rated SR skills in the day care environment are related to children's social, communication, learning and motor skills. Earlier studies have also found SR skills to be very significant in people's everyday social relations and studying (Moffitt et al., 2011; Lengua et al., 2007; Eisenberg et al., 2003; NICHD Early Child Care Research Network, 2003). It is possible that children with better SR skills can steer their development in a more meaningful way than other children. For example, developing gross and fine motor skills often require long-term concentration and much repetition.

Children with good teacher-rated SR skills did not have special needs as often as other children. The children having special needs especially in executive functions and language delayed development were in the category of weaker SR more often. In a McClelland et al. (2007) study it was also highlighted how SR was positively associated with children's development of vocabulary and literacy skills. The results describe how SR skills could fundamentally influence children's social interactions in peer relations. Language plays an important role in controlling the child's own cognitive, emotional and attentional processes and the dynamics of the peer relations (Aro 2003, pp. 244–245; Ayduk et al., 2000). Likewise, the results describe the connection between children's language skills and teacher-rated SR skills. Language gives the child an opportunity to use inner speech, and, by doing so, to support the regulatory system (Vygotsky, 1978). It may be that children with difficulties in SR skills have more difficulties in planning, organizing and

completing different kinds of tasks in the ECE environment. Socio-emotional disabilities and developmental disabilities were also highly related to children with weak teacher-rated SR skills. Socio-emotional disabilities can be associated with internalizing or externalizing difficulties. Internalizing difficulties are manifested by anxiety, depression, withdrawal, fear or shyness, whereas externalizing problems include aggression, hyperactivity, impulsivity and inattentiveness (Briggs-Gowan, Carter, Bosson-Heenan, Guyer, & Horwitz, 2006).

In summary, SR skills are essential for building a comprehensive and prosperous life. It is important for day care personnel to understand the variety of young children's self-regulatory systems and how this relates to different kinds of important skills that children need in everyday life in day care. In addition, our study clearly revealed that a child's SR skills are not isolated, and that they should be viewed as significant and dynamic. The educators in ECE should regard the development of children's SR skills as a holistic concept and follow their development in the learning environment, which includes emotions and different skills mediated by social relations. In conclusion, the different aspects of SR fit together in a meaningful way. The results also highlight the comprehensive nature of well-balanced SR, in which skills, social aspects and learning are intertwined.

Good SR skills are essential for children's development. When children acquire balanced SR skills, they are better equipped to take the hold of their lives. With their close connections to learning, even to gross motor development, children's SR skills seem to be related to the ability of children to steer their action in a meaningful way. Thus, it is important to help children with their SR as soon as possible, to prevent differences between children from increasing. With more closely connected social relations, children are more able to regulate their behaviour also with others and succeed in regulating others as well, resulting in collaborative and shared cultural co-production.

## The limitations of the study

When viewing the limitations of the study, it needs to be remembered that the results were mostly correlations, with no clear indication of what the causes and results of their interconnections were. Secondly, the instrument of the SR was based on one measure of the same teacher-rated evaluation form. Therefore, the connections are not independent for each other. Kochanska, Murray and Harlan (2000) showed that by 33 months gender differences had emerged rapidly in SR skills and that later boys had lower SR skills than girls. Nonetheless, it is remarkable how large the differences were. Girls' SR skills were considerably better than boys'. Therefore, it is very important that employees in ECE focus on observing and supporting particularly boys' SR skills by participating in their everyday life. However, we need to be careful with our conclusions. Most of the evaluators were female. It may be possible that boys and girls manifest SR skills in different contexts. It is also possible that the learning environment, which has been developed mainly by female educators, tends to help girls get a better hold of themselves in the day care learning environment. For

example, it may be possible that boys and girls have different criterions for appropriate physical activity or ways to confront difficult issues. It is also possible that boys and girls have different ways to express frustration and regulation. There may also be different strategies to resolving situations. The differences do not necessary mean that girls or boys have better or worse strategies: girls and boys may just manifest different cultural traditions or may simply be different. It is also possible that for some reason female evaluators find girls' strategies more appropriate.

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